CLAIMS

1. A method of producing an active nickel powder, said method comprising the steps of :

a) providing a feed material comprising nickel chloride wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C, and

c) recovering the resulting active nickel powder.

2. A method of producing an active nickel powder, said method comprising the steps of :

a) providing a feed material comprising nickel chloride and other reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, wherein the weight ratio of chloride to total nickel is greater than 0.1 and wherein the feed material has a surface area in excess of about 1 m2/g; preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C, and

c) recovering the resulting active nickel powder.

3. A method of producing an active nickel powder, said method comprising the steps of :

a) providing a feed material comprising reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, and optionally nickel chloride, and wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C and concurrently contacting said feed material with HCl gas so as convert at least a portion of the reducible nickel salts feed material to nickel chloride and wherein the resulting ratio of chloride to total nickel is greater than 0.1, and

c) recovering the resulting active nickel powder.

4. A method of producing an active nickel powder, said method comprising the steps of :

a) providing a feed material comprising reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, and optionally nickel chloride, mixed with other soluble metal chloride salts, such as $CrCl_3$, $FeCl_3$, $FeCl_2$, wherein the weight ratio of chloride to total nickel is greater than 0.1 and wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C, and

c) recovering the resulting active nickel powder.

5. A method of producing nickel carbonyl, said method comprising the steps of:

a) providing a feed material comprising nickel chloride wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C;

c) contacting the resulting active nickel powder with a gas containing carbon monoxide at atmospheric or super atmospheric pressure to obtain nickel carbonyl.

6. A method of producing nickel carbonyl, said method comprising the steps of:

a) providing a feed material comprising nickel chloride and other reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, wherein the weight ratio of chloride to total nickel is greater than 0.1 and wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C, and

c) contacting the resulting active nickel powder with a gas containing carbon monoxide at atmospheric or superatmospheric pressure to obtain nickel carbonyl.

7. A method of producing nickel carbonyl, said method comprising the steps of:

a) providing a feed material comprising reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, and optionally nickel chloride, and wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C and concurrently contacting said feed material with HCl gas so as convert at least a portion of the reducible nickel salts feed material to nickel chloride and wherein the resulting ratio of chloride to total nickel is greater than 0.1, and

c) contacting the resulting active nickel powder with a gas containing carbon monoxide at atmospheric or superatmospheric pressure to obtain nickel carbonyl.

8. A method of producing nickel carbonyl, said method comprising the steps of:

a) providing a feed material comprising reducible nickel salts, such as nickel carbonate, nickel sulphate and nickel hydroxide, and optionally nickel chloride, mixed with other soluble metal chloride salts, such as $CrCl_3$, $FeCl_3$, $FeCl_2$, wherein the weight ratio of chloride to total nickel is greater than 0.1 and wherein the feed material has a surface area in excess of about 1 m^2/g, preferably between 35 and 100 m^2/g;

b) reducing said feed material with a reducing gas at a temperature of at least about 300°C, and

c) contacting the resulting active nickel powder with a gas containing carbon monoxide at atmospheric or superatmospheric pressure to obtain nickel carbonyl.

9. The method of any one of claims 1 to 8 wherein said reducing step b) is performed at temperatures between 300°C and 600°C.

10. The method of any one of claims 5 to 8 wherein step c) is performed at temperatures between 20°C and 100°C.

11. The method of any one of claims 1 to 10 wherein step a) is performed by mixing together dry components.

12. The method of any one of claims 1 to 10 wherein step a) is performed by wet mixing components and then removing the water by drying.

13. The method of any one of claims 1 to 10 wherein step a) is performed by wet mixing components in the presence of HCl.

14. The method of any one of claims 1 to 10 wherein step a) is performed by adding alkali, such as Na_2CO_3, to an aqueous solution of reducible nickel salts, including nickel chloride, and then removing the water by drying.

15. The method of any one of claims 1 to 14 wherein the reducing gas in step b) contains hydrogen.

16. The method of any one of claims 12 to 15 wherein the drying portion of steps a) and the reducing portion of step b) are conducted concurrently.

17. The method of any one of claims 12 to 15 wherein steps a) and b) are conducted sequentially.

18. The method of any one of claims 1 and 5 wherein in step a), said nickel chloride is in the form of hydrates of nickel, such as $NiCl_2.6H_20$.

19. Method according to any one of claims 1 to 18, wherein if the active nickel powder becomes de-activated due to storage in the absence of oxygen at the end of the process of claims 1 to 4 or after step b) in claims 5 to 8, it is re-activated by exposing it to gas containing H_2 at a temperature of at least about 150°C.

20. Method according to any one of claims 1 to 18, wherein if the active nickel powder becomes de-activated due to storage in the absence of oxygen, it is re-activated by exposing it to gas containing H_2 at a temperature between 150°C and 600°C.

21. Method according to claim 1 wherein in step a), the weight ratio of chloride to total nickel is grater than 0.1.